

WHAT IS CLAIMED IS:

1. An aqueous pesticidal concentrate composition comprising:

a water-soluble pesticide dissolved in an aqueous medium, the water-soluble pesticide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant;

a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants; and

a compound which increases cell membrane permeability within the plant to increase cellular uptake of the pesticide in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture,

wherein said compound and said surfactant component are present in a molar ratio exceeding 10:1.

2. A composition of claim 1 wherein the pesticide comprises a herbicide.

3. A composition of claim 2 wherein the herbicide comprises glyphosate or a salt or ester thereof.

4. A composition of claim 3 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

5. A composition of claim 4 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, or hexamethylenediamine salt thereof.

6. A composition of claim 5 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, or monoethanolamine salt thereof.
7. A composition of claim 1 wherein said compound and said surfactant component are present in a molar ratio exceeding 15:1.
8. A composition of claim 1 wherein said composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.
9. A composition of claim 1 wherein said compound comprises oxalic acid or a salt thereof.
10. A composition of claim 1 wherein the cell membrane permeability is increased by chelating calcium in the cell wall or apoplast which compromises calcium dependent defense responses.
11. A composition of claim 3 wherein the glyphosate concentration is in excess of 400 grams glyphosate a.e. per liter.
12. An aqueous herbicidal concentrate composition comprising:  
glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration in excess of 455 grams glyphosate a.e. per liter; and  
a compound which increases cell membrane permeability within the plant such that, when said composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant, cellular uptake of glyphosate is increased in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

13. A composition of claim 12 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

14. A composition of claim 12 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

15. A composition of claim 12 wherein said compound comprises oxalic acid or a salt thereof.

16. A composition of claim 12 wherein the cell membrane permeability is increased by chelating calcium in the cell wall or apoplast which compromises calcium dependent defense responses.

17. An aqueous herbicidal concentrate composition comprising:  
glyphosate predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant;

a compound which increases cell membrane permeability within the plant to increase cellular uptake of the glyphosate in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

18. A composition of claim 17 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, or monoethanolamine salt thereof.
19. A composition of claim 18 wherein the glyphosate is predominantly in the form of the potassium or monoethanolamine salt thereof.
20. A composition of claim 17 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in an aqueous medium, comprising one or more surfactant(s) in a total amount of about 20 to about 300 grams per liter of composition.
21. A composition of claim 17 wherein said compound comprises oxalic acid or a salt thereof.
22. A composition of claim 17 wherein the cell membrane permeability is increased by chelating calcium in the cell wall or apoplast which compromises calcium dependent defense responses.
23. A composition of claim 17 wherein the glyphosate concentration is in excess of 400 grams glyphosate a.e. per liter.
24. A composition of claim 23 wherein the glyphosate concentration is in excess of 450 grams glyphosate a.e. per liter.
25. A composition of claim 24 wherein the glyphosate concentration is in excess of 500 grams glyphosate a.e. per liter.
26. An aqueous herbicidal concentrate composition comprising:  
glyphosate predominantly in the form of the potassium salt thereof, in solution in an aqueous medium in a concentration that is biologically effective when

the composition is diluted in a suitable volume of water to form an enhanced  
5 application mixture and applied to the foliage of a susceptible plant; and  
a compound which increases cell membrane permeability within the plant to  
increase cellular uptake of the glyphosate in the plant treated with said enhanced  
application mixture as compared to a plant treated with a reference application  
mixture devoid of said compound but otherwise having the same composition as  
10 said enhanced application mixture.

27. A composition of claim 26 further including a surfactant component in  
solution or stable suspension, emulsion, or dispersion in said medium, comprising  
one or more surfactant(s) in a total amount of about 20 to about 300 grams per liter  
of composition.

28. A composition of claim 26 wherein said compound comprises oxalic acid or a  
salt thereof.

29. A composition of claim 26 wherein the cell membrane permeability is  
increased by chelating calcium in the cell wall or apoplast which compromises  
calcium dependent defense responses.

30. A composition of claim 26 wherein the concentration of potassium  
glyphosate is in excess of 300 grams glyphosate a.e. per liter.

31. A composition of claim 30 wherein the concentration of potassium  
glyphosate is in excess of 400 grams glyphosate a.e. per liter.

32. A composition of claim 31 wherein the concentration of potassium  
glyphosate is in excess of 500 grams glyphosate a.e. per liter.

33. An aqueous pesticidal concentrate composition comprising:  
a water-soluble pesticide dissolved in an aqueous medium, the water-soluble  
pesticide being present in a concentration that is biologically effective when the

composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant;

a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants; and

a compound which suppresses oxidative burst in cells of the plant to interfere with plant defense response in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture,

wherein said compound and said surfactant component are present in a molar ratio exceeding 10:1.

34. A composition of claim 33 wherein the pesticide comprises a herbicide.

35. A composition of claim 34 wherein the herbicide comprises glyphosate or a salt or ester thereof.

36. A composition of claim 35 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

37. A composition of claim 36 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, or hexamethylenediamine salt thereof.

38. A composition of claim 37 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, or monoethanolamine salt thereof.

39. A composition of claim 38 wherein said compound and said surfactant component are present in a molar ratio exceeding 15:1.

40. A composition of claim 33 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

41. A composition of claim 33 wherein the oxidative burst is suppressed by directly inhibiting free-radical generating oxidase.

42. A composition of claim 33 wherein the oxidative burst is suppressed by blocking a signaling step leading to activation of free-radical generating oxidase.

43. A composition of claim 35 wherein the glyphosate concentration is in excess of 400 grams glyphosate a.e. per liter.

44. A composition of claim 43 wherein the glyphosate concentration is in excess of 450 grams glyphosate a.e. per liter.

45. A composition of claim 44 wherein the glyphosate concentration is in excess of 500 grams glyphosate a.e. per liter.

46. An aqueous herbicidal concentrate composition comprising:  
glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration in excess of 455 grams glyphosate a.e. per liter; and  
a compound which suppresses oxidative burst in cells of a plant, such that,  
when said composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant, plant defense response is abated in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

47. A composition of claim 46 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

48. A composition of claim 46 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

49. A composition of claim 46 wherein the oxidative burst is suppressed by directly inhibiting free-radical generating oxidase.

50. A composition of claim 46 wherein the oxidative burst is suppressed by blocking a signaling step leading to activation of free-radical generating oxidase.

51. An aqueous herbicidal concentrate composition comprising:  
glyphosate predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and  
a compound which suppresses oxidative burst in cells of the plant to interfere with plant defense response in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.



52. A composition of claim 51 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, or monoethanolamine salt thereof.
53. A composition of claim 52 wherein the glyphosate is predominantly in the form of the potassium or monoethanolamine salt thereof.
54. A composition of claim 51 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in an aqueous medium, comprising one or more surfactant(s) in a total amount of about 20 to about 300 grams per liter of composition.
55. A composition of claim 51 wherein the oxidative burst is suppressed by directly inhibiting free-radical generating oxidase.
56. A composition of claim 51 wherein the oxidative burst is suppressed by blocking a signaling step leading to activation of free-radical generating oxidase.
57. A composition of claim 51 wherein the glyphosate concentration is in excess of 400 grams glyphosate a.e. per liter.
58. A composition of claim 57 wherein the glyphosate concentration is in excess of 450 grams glyphosate a.e. per liter.
59. A composition of claim 58 wherein the glyphosate concentration is in excess of 500 grams glyphosate a.e. per liter.
60. An aqueous herbicidal concentrate composition comprising:  
glyphosate predominantly in the form of the potassium salt thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

a compound which suppresses oxidative burst in cells of the plant to interfere with plant defense response in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

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61. A composition of claim 60 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s) in a total amount of about 20 to about 300 grams per liter of composition.

62. A composition of claim 60 wherein the oxidative burst is suppressed by directly inhibiting free-radical generating oxidase.

63. A composition of claim 60 wherein the oxidative burst is suppressed by blocking a signaling step leading to activation of free-radical generating oxidase.

64. A composition of claim 60 wherein the concentration of potassium glyphosate is in excess of 400 grams glyphosate a.e. per liter.

65. A composition of claim 64 wherein the concentration of potassium glyphosate is in excess of 450 grams glyphosate a.e. per liter.

66. A composition of claim 65 wherein the concentration of potassium glyphosate is in excess of 500 grams glyphosate a.e. per liter.

67. An aqueous herbicidal concentrate composition comprising:  
glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration in excess of 455 grams glyphosate a.e. per liter; and  
oxalic acid or a salt thereof in a concentration such that, when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant, growth of the plant is

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controlled to a greater extent than in a plant treated with a reference application mixture devoid of oxalic acid and said salt but otherwise having the same composition as said enhanced application mixture.

68. A composition of claim 67 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

69. A composition of claim 67 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

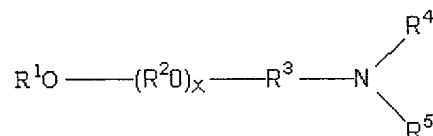
70. An aqueous herbicidal composition comprising:  
glyphosate predominantly in the form of the potassium salt thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible broadleaf plant; and  
5 oxalic acid or a salt thereof in a concentration such that growth of the plant is controlled to a greater extent as compared to a plant treated with a reference application mixture devoid of oxalic acid and said salt but otherwise having the same composition as said enhanced application mixture.

71. A composition of claim 70 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

72. A composition of claim 70 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

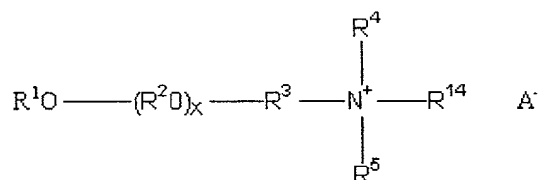
73. A composition of claim 71 wherein the surfactant component comprises one or more cationic, nonionic or anionic surfactants.

74. A composition of claim 73 wherein the surfactant component comprises an aminated alkoxylated alcohol having the formula:



(5)

or



(6)

wherein R<sup>1</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R<sup>2</sup> in each of the x (R<sup>2</sup>O) and y (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene; R<sup>3</sup> and R<sup>6</sup> are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R<sup>4</sup> is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, -(R<sup>6</sup>)<sub>n</sub>-(R<sup>2</sup>O)<sub>y</sub>R<sup>7</sup>, -C(=NR<sup>11</sup>)NR<sup>12</sup>R<sup>13</sup>, -C(=O)NR<sup>12</sup>R<sup>13</sup>, -(R<sup>6</sup>)<sub>n</sub>-C(O)OR<sup>7</sup>, -C(=S)NR<sup>12</sup>R<sup>13</sup> or together with R<sup>5</sup> and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R<sup>5</sup> is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, -(R<sup>6</sup>)<sub>n</sub>-(R<sup>2</sup>O)<sub>y</sub>R<sup>7</sup>, -C(=NR<sup>11</sup>)NR<sup>12</sup>R<sup>13</sup>, -C(=O)NR<sup>12</sup>R<sup>13</sup>, -(R<sup>6</sup>)<sub>n</sub>-C(O)OR<sup>7</sup>, -C(=S)NR<sup>12</sup>R<sup>13</sup>, or together with R<sup>4</sup> and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R<sup>7</sup> is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; R<sup>11</sup>, R<sup>12</sup> and R<sup>13</sup> are

20 hydrogen, hydrocarbyl or substituted hydrocarbyl,  $R^{14}$  is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl,  $-(R^6)_n-(R^2O)_yR^7$ ,  $-C(=NR^{11})NR^{12}R^{13}$ ,  $-C(=O)NR^{12}R^{13}$ , or  $-C(=S)NR^{12}R^{13}$ ,  $n$  is 0 or 1,  $x$  and  $y$  are independently an average number from 1 to about 60, and  $A^-$  is an agriculturally acceptable anion.

75. An aqueous herbicidal composition comprising:

glyphosate predominantly in the form of the diammonium salt thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible broadleaf plant; and

5 oxalic acid or a salt thereof in a concentration such that growth of the plant is controlled to a greater extent as compared to a plant treated with a reference application mixture devoid of oxalic acid and said salt but otherwise having the same composition as said enhanced application mixture.

76. A composition of claim 75 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

77. A composition of claim 75 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

78. A composition of claim 75 wherein the weight ratio of glyphosate a.e. said oxalic acid is between about 1:1 and about 10:1.

79. A composition of claim 78 wherein the weight ratio of glyphosate a.e. said oxalic acid is about 3:1.

80. An aqueous herbicidal composition comprising:

glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

a tetraalkylammonium or aryltrialkylammonium salt of oxalic acid in a concentration such that growth of the plant treated with said enhanced application mixture is controlled to a greater extent as compared to a plant treated with a reference application mixture devoid of said salt but otherwise having the same composition as said enhanced application mixture.

81. A composition of claim 80 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

82. A composition of claim 80 wherein said oxalic acid salt comprises hexadecyltrimethyl ammonium halide, tetrabutyl ammonium halide, triethyl benzyl ammonium halide, tetraethyl ammonium halide, triethyl N-butyl ammonium halide, tetrapropyl ammonium halide, tetrabutyl ammonium halide, phenyl trimethyl ammonium halide, tetramethyl ammonium halide, myristyl trimethyl ammonium halide, cetyl trimethyl ammonium halide, tetra-N-propyl ammonium halide, triethyl benzyl ammonium halide, trimethyl benzyl ammonium halide, benzyl triethyl ammonium halide, benzyl trimethyl ammonium halide, benzyl tributyl ammonium halide, triethyl butyl ammonium halide, tributyl ethyl ammonium halide, tributyl methyl ammonium halide, dodecyltrimethyl ammonium halide, hexadecyltrimethyl ammonium hydroxide, tetrabutyl ammonium hydroxide, triethyl benzyl ammonium hydroxide, tetraethyl ammonium hydroxide, triethyl N-butyl ammonium hydroxide, tetrapropyl ammonium hydroxide, tetrabutyl ammonium hydroxide, phenyl trimethyl ammonium hydroxide, tetramethyl ammonium hydroxide, myristyl trimethyl ammonium hydroxide, cetyl trimethyl ammonium hydroxide, tetra-N-propyl ammonium hydroxide, triethyl benzyl ammonium hydroxide, trimethyl benzyl ammonium hydroxide, benzyl triethyl ammonium hydroxide, benzyl trimethyl

ammonium hydroxide, benzyl tributyl ammonium hydroxide, triethyl butyl  
ammonium hydroxide, tributyl ethyl ammonium hydroxide, tributyl methyl  
20 ammonium hydroxide, or dodecyl trimethyl ammonium hydroxide.

83. A composition of claim 80 wherein said plants are broadleaf plants.

84. An aqueous herbicidal composition comprising:

glyphosate or a salt or ester thereof, in solution in an aqueous medium in a  
concentration that is biologically effective when the composition is diluted in a  
suitable volume of water to form an enhanced application mixture and applied to  
5 the foliage of a susceptible plant;

a surfactant component in solution or stable suspension, emulsion, or  
dispersion in said medium, comprising one or more surfactant(s); and

oxalic acid or a salt thereof, wherein the concentration of oxalic acid or said  
salt and the nature of said surfactant are such that a first difference between:

10 (i) the growth rate of a plant treated with a first enhanced application mixture  
prepared by dilution of said aqueous herbicidal composition with water and

(ii) the growth rate of a plant treated with a first reference application mixture  
devoid of oxalic acid and any said salt but otherwise having the same  
composition as said first enhanced application mixture

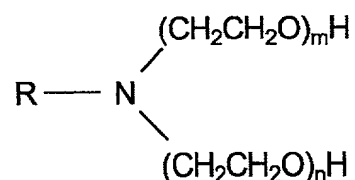
15 is greater than a second difference between:

(iii) the growth rate of a plant treated with a second enhanced application  
mixture and

20 (iv) the growth rate of a plant treated with a second reference application  
mixture devoid of oxalic acid and any said salt but otherwise having the  
same composition as said second enhanced application mixture,

wherein the composition of said second enhanced application mixture differs from the composition of said first enhanced application mixture only with respect to the nature of the surfactant system contained therein, said second enhanced application mixture containing one of the following cationic surfactants selected from the group consisting of:

an ethoxylated tallowamine surfactant having the formula:



(3)

wherein R is a mixture of predominantly C<sub>16</sub> and C<sub>18</sub> alkyl and alkenyl chains derived from tallow and the total of m+n is an average number of about 15, wherein the weight ratio of glyphosate a.e. to surfactant in the second enhanced application mixture is about 2:1;

cocoalkyltrimethylammonium chloride, wherein the weight ratio of glyphosate a.e. to surfactant in the second enhanced application mixture is about 4:1; and

POE(15)cocoalkylmonomethylammonium chloride, wherein the weight ratio of glyphosate a.e. to surfactant in the second enhanced application mixture is about 4:1.

85. A composition of claim 84 wherein said plant comprises a broadleaf plant.

86. An aqueous herbicidal composition comprising:

glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration in excess of 360 grams glyphosate a.e. per liter; and

oxalic acid or a salt thereof in a concentration such that, when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible broadleaf plant, growth of the plant is controlled to a greater extent as compared to a broadleaf plant treated with



a reference application mixture, wherein the composition of said reference application mixture differs from the composition of said enhanced application mixture only in that it is devoid of oxalic acid and said salt and it contains ethylenediaminetetraacetic acid or sodium citrate.

87. A composition of claim 86 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

88. A composition of claim 86 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

89. An aqueous herbicidal composition comprising:

glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

oxalic acid or a salt thereof in a concentration such that growth of the plant is controlled to a greater extent as compared to a plant treated with a reference application mixture devoid of oxalic acid and said salt but otherwise having the same composition as said enhanced application mixture;

wherein the composition has a density of at least about 1.210 grams/liter.

90. A composition of claim 89 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

91. A composition of claim 89 wherein the composition has a density of at least about 1.230 grams/liter.

92. A composition of claim 91 wherein the composition has a density of at least about 1.240 grams/liter.

93. A composition of claim 89 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

94. An aqueous herbicidal concentrate composition comprising:

glyphosate predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof, in  
5 solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

oxalic acid or a salt thereof in a concentration such that growth of the plant is controlled to a greater extent as compared to a plant treated with a reference  
10 application mixture devoid of oxalic acid and said salt but otherwise having the same composition as said enhanced application mixture.

95. A composition of claim 94 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s) in a total amount of about 20 to about 300 grams per liter of composition.

96. A composition of claim 94 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

97. An aqueous herbicidal composition comprising:

glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant; and

5 oxalic acid or a salt thereof;

wherein the glyphosate a.e. and the oxalic acid are present in a weight ratio greater than 21:1.

98. A composition of claim 97 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s).

99. An aqueous pesticidal concentrate composition comprising:

a water-soluble pesticide dissolved in an aqueous medium, the water-soluble pesticide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant;

a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants; and

a compound which increases expression of hydroxyproline-rich glycoproteins which increases movement of said pesticide to the phloem in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture,

wherein said compound and said surfactant component are present in a molar ratio exceeding 10:1.

100. A composition of claim 99 wherein the pesticide comprises a herbicide.

101. A composition of claim 100 wherein the herbicide comprises glyphosate or a salt or ester thereof.

102. A composition of claim 101 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

103. A composition of claim 102 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, or hexamethylenediamine salt thereof.

104. A composition of claim 103 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, or monoethanolamine salt thereof.

105. A composition of claim 104 wherein said compound and said surfactant component are present in a molar ratio exceeding 15:1.

106. A composition of claim 99 wherein said composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

107. A composition of claim 99 wherein said compound comprises oxalic acid or a salt thereof.

108. A composition of claim 101 wherein the glyphosate concentration is in excess of 400 grams glyphosate a.e. per liter.

109. An aqueous herbicidal concentrate composition comprising:

glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration in excess of 455 grams glyphosate a.e. per liter; and

a compound which increases expression of hydroxyproline-rich glycoproteins such that, when said composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant, movement of said glyphosate to the phloem is increased in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

110. A composition of claim 109 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

111. A composition of claim 109 further including a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactants, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

112. A composition of claim 109 wherein said compound comprises oxalic acid or a salt thereof.

113. An aqueous herbicidal concentrate composition comprising:

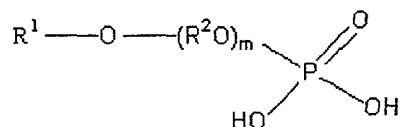
(i) glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

(ii) a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s); and

(iii) oxalic acid or a salt thereof;

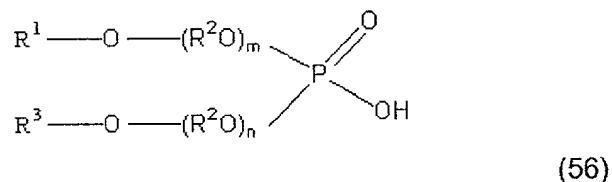
wherein the surfactant component comprises at least one surfactant selected from the group consisting of:

(a) a phosphate ester having the formula:



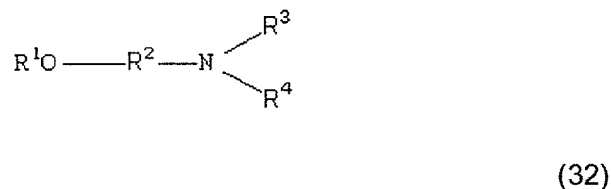
wherein  $R^1$  is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  is from 1 to about 30;

(b) a phosphate diester having the formula:



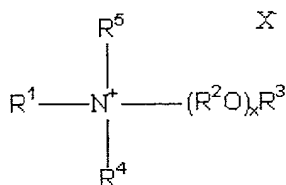
wherein  $R^1$  and  $R^3$  are independently a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) and the  $n$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  and  $n$  are independently from 1 to about 30;

(c) etheramines having the formula:



wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $R^2$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms;  $R^3$  and  $R^4$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^5O)_xR^6$ ,  $R^5$  in each of the  $x(R^5O)$  groups is independently  $C_2$ - $C_4$  alkylene,  $R^6$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 50; and

(d) monoalkoxylated quaternary ammonium salts having the formula:



(30)

35 wherein R<sup>1</sup> and R<sup>5</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>4</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> in each of the x (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or  
40 branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X<sup>-</sup> is an agriculturally acceptable anion.

114. A composition of claim 113 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, isopropylamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

115. A composition of claim 114 wherein the weight ratio of glyphosate a.e. to surfactant is between about 6:1 and about 1:1.

116. A method of decreasing surfactant content of an aqueous herbicidal concentrate composition required to provide a given degree of growth control observed when the composition is diluted with water and applied to foliage of a plant, the method comprising adding oxalic acid or a salt thereof to said  
5 composition, said composition comprising glyphosate or a salt or ester thereof and one or more surfactants.

117. The method of claim 116 wherein the weight ratio of glyphosate a.e. to said oxalic acid is between about 1:30 and about 100:1.

118. A method of decreasing aquatic toxicity of an aqueous herbicidal composition without decreasing growth control observed when the composition is

diluted with water and applied to foliage of a plant, the method comprising adding oxalic acid or a salt thereof to said composition, said composition comprising  
5 glyphosate or a salt or ester thereof.

119. A method of claim 118 further including a surfactant component comprising one or more surfactants.

120. The method of claim 118 wherein the weight ratio of glyphosate a.e. to said oxalic acid is between about 1:30 and about 100:1.

121. A method of controlling growth of morningglory, the method comprising applying an aqueous composition to foliage of said morningglory, said composition comprising glyphosate or a salt or ester thereof and oxalic acid or a salt thereof.

122. The method of claim 121 wherein the weight ratio of glyphosate a.e. to said oxalic acid is between about 1:30 and about 100:1.

123. An aqueous herbicidal concentrate composition comprising:

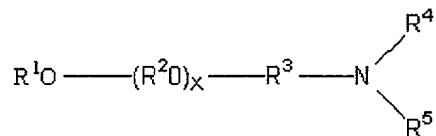
(i) glyphosate or a salt or ester thereof, in solution in an aqueous medium in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

5 (ii) a surfactant component in solution or stable suspension, emulsion, or dispersion in said medium, comprising one or more surfactant(s); and

(iii) oxalic acid or a salt thereof;

wherein the surfactant component comprises at least one surfactant selected from the group consisting of:

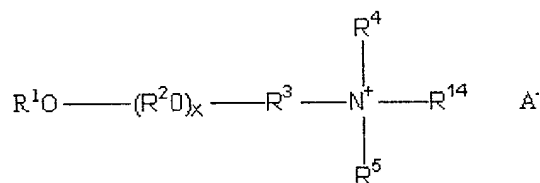
10 (a) aminated alkoxyated alcohol having the formula:



(5)



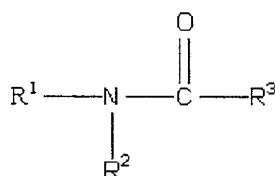
or



(6)

wherein R<sup>1</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R<sup>2</sup> in each of the x (R<sup>2</sup>O) and y (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene; R<sup>3</sup> and R<sup>6</sup> are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R<sup>4</sup> is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, -(R<sup>6</sup>)<sub>n</sub>-(R<sup>2</sup>O)<sub>y</sub>R<sup>7</sup>, -C(=NR<sup>11</sup>)NR<sup>12</sup>R<sup>13</sup>, -C(=O)NR<sup>12</sup>R<sup>13</sup>, -(R<sup>6</sup>)<sub>n</sub>-C(O)OR<sup>7</sup>, -C(=S)NR<sup>12</sup>R<sup>13</sup> or together with R<sup>5</sup> and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R<sup>5</sup> is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, -(R<sup>6</sup>)<sub>n</sub>-(R<sup>2</sup>O)<sub>y</sub>R<sup>7</sup>, -C(=NR<sup>11</sup>)NR<sup>12</sup>R<sup>13</sup>, -C(=O)NR<sup>12</sup>R<sup>13</sup>, -(R<sup>6</sup>)<sub>n</sub>-C(O)OR<sup>7</sup>, -C(=S)NR<sup>12</sup>R<sup>13</sup>, or together with R<sup>4</sup> and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R<sup>7</sup> is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; R<sup>11</sup>, R<sup>12</sup> and R<sup>13</sup> are hydrogen, hydrocarbyl or substituted hydrocarbyl, R<sup>14</sup> is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, -(R<sup>6</sup>)<sub>n</sub>-(R<sup>2</sup>O)<sub>y</sub>R<sup>7</sup>, -C(=NR<sup>11</sup>)NR<sup>12</sup>R<sup>13</sup>, -C(=O)NR<sup>12</sup>R<sup>13</sup>, or -C(=S)NR<sup>12</sup>R<sup>13</sup>, n is 0 or 1, x and y are independently an average number from 1 to about 60, and A<sup>-</sup> is an agriculturally acceptable anion;

(b) hydroxylated amides having the formula:



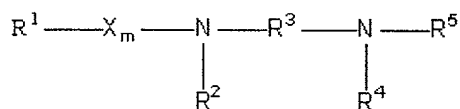
35

(7)

wherein R<sup>1</sup> is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R<sup>2</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and R<sup>3</sup> is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

40

(c) diamines having the formula:

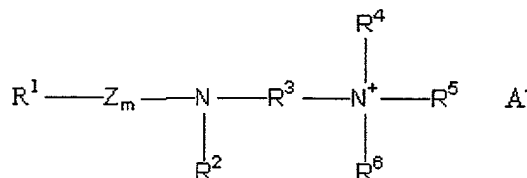


(9)

45

wherein R<sup>1</sup>, R<sup>2</sup> and R<sup>5</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or -R<sup>8</sup>(OR<sup>9</sup>)<sub>n</sub>OR<sup>10</sup>, R<sup>3</sup> is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R<sup>8</sup> and R<sup>9</sup> are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R<sup>4</sup> and R<sup>10</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, and X is -C(O)- or -SO<sub>2</sub>-;

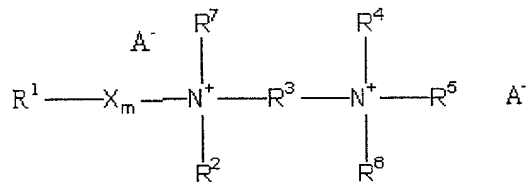
(d) mono- or di-ammonium salts having the formula:



50

(10)

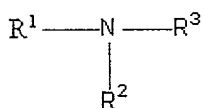
or



(11)

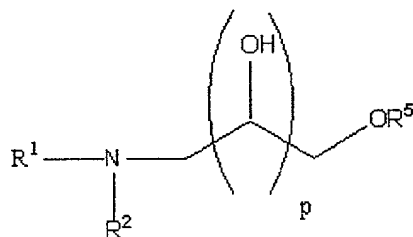
wherein  $\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^4$ ,  $\text{R}^5$  and  $\text{R}^7$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or  $-\text{R}^8(\text{OR}^9)_n\text{OR}^{10}$ ,  $\text{R}^6$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $\text{R}^3$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $\text{R}^8$  and  $\text{R}^9$  are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms,  $\text{R}^{10}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $m$  is 0 or 1,  $n$  is an average number from 0 to about 40,  $\text{X}$  is  $-\text{C}(\text{O})-$  or  $-\text{SO}_2-$ ,  $\text{Z}$  is  $-\text{C}(\text{O})-$ , and  $\text{A}^-$  is an agriculturally acceptable anion;

(e) poly(hydroxyalkyl)amines having the formula:



(12)

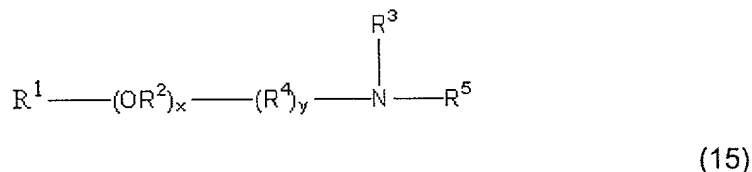
or



(12A)

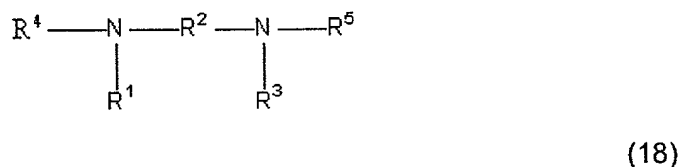
wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or  $-R^4OR^8$ ,  $R^2$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^3$  is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl,  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms,  $R^8$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and  $R^5$  is  $-(R^6O)_yR^7$ ;  $R^6$  in each of the  $y(R^6O)$  groups is independently  $C_2-C_4$  alkylene;  $R^7$  is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; and  $y$  is an average number from 0 to about 30;

(f) alkoxyated poly(hydroxyalkyl)amines having the formula:



wherein  $R^1$  and  $R^3$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x(R^2O)$  groups is independently  $C_2-C_4$  alkylene;  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms,  $R^5$  is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;  $x$  is an average number from 0 to about 30, and  $y$  is 0 or 1;

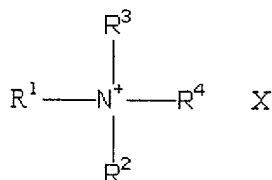
(g) di-poly(hydroxyalkyl)amine having the formula:



wherein  $R^1$  and  $R^3$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms,  $R^2$  is hydrocarbylene or

substituted hydrocarbylene having from 2 to about 18 carbon atoms, and  $R^4$  and  $R^5$  are independently hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

(h) quaternary poly(hydroxyalkyl)amine salts having the formula:



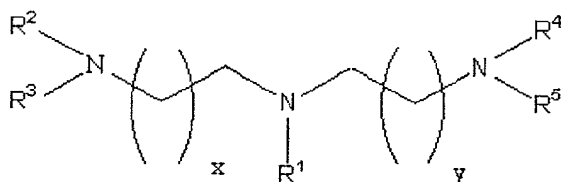
95

(20)

wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms,  $R^2$  and  $R^3$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^4$  is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, and  $X^-$  is an agriculturally acceptable anion;

100

(i) triamines having the formula:



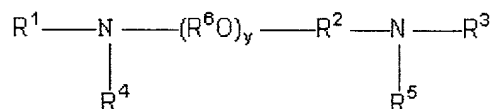
(23)

wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $R^2$ ,  $R^3$ ,  $R^4$  and  $R^5$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^8)_s(R^7O)_nR^6$ ;  $R^6$  is hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $R^7$  in each of the  $n$   $(R^7O)$  groups is independently  $C_2$ - $C_4$  alkylene;  $R^8$  is hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms,  $n$  is an average number from 1 to about 10,  $s$  is 0 or 1, and  $x$  and  $y$  are independently an integer from 1 to about 4;

105

110

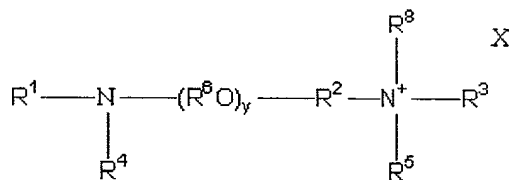
(j) diamines having the formula:



(24)

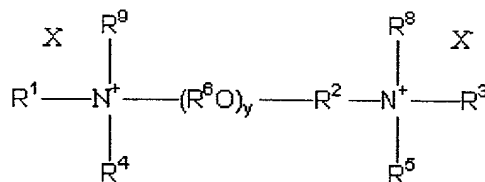
wherein  $\text{R}^1$ ,  $\text{R}^3$ ,  $\text{R}^4$  and  $\text{R}^5$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^6\text{O})_x\text{R}^7$ ,  $\text{R}^2$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $\text{C}(=\text{NR}^{11})\text{NR}^{12}\text{R}^{13}$ -,  $-\text{C}(=\text{O})\text{NR}^{12}\text{R}^{13}$ -,  $-\text{C}(=\text{S})\text{NR}^{12}\text{R}^{13}$ -,  $-\text{C}(=\text{NR}^{12})$ -,  $-\text{C}(\text{S})$ -, or  $-\text{C}(\text{O})$ -,  $\text{R}^6$  in each of the  $x$  ( $\text{R}^6\text{O}$ ) and  $y$  ( $\text{R}^6\text{O}$ ) groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene,  $\text{R}^7$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms,  $\text{R}^{11}$ ,  $\text{R}^{12}$  and  $\text{R}^{13}$  are hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $x$  is an average number from 1 to about 50, and  $y$  is an average number from 0 to about 60;

(k) mono- or di-quaternary ammonium salts having the formula:



(25)

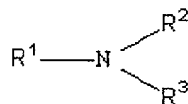
or



(26)

wherein  $R^1$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^8$  and  $R^9$  are independently hydrogen, polyhydroxyalkyl, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or -  
 130  $(R^6O)_xR^7$ ,  $R^2$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $R^6$  in each of the  $x$   $(R^6O)$  and  $y$   $(R^6O)$  groups is independently  $C_2$ - $C_4$  alkylene,  $R^7$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $x$  is an average number from 1 to about 30,  $y$  is an average number from about 3 to about 60, and  $X^-$  is an agriculturally acceptable anion;

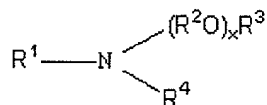
135 (l) a secondary or tertiary amine having the formula:



(27)

wherein  $R^1$  and  $R^2$  are hydrocarbyl having from 1 to about 30 carbon atoms, and  $R^3$   
 140 is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

(m) monoalkylated amines having the formula:

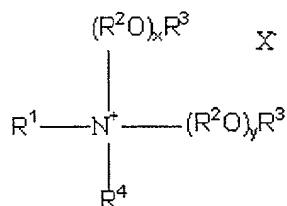


(28)

wherein  $R^1$  and  $R^4$  are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or  $-R^5SR^6$ ,  $R^2$  in each of the  $x$   $(R^2O)$  groups  
 145 is independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $R^5$  is a linear or branched alkyl group having from about 6 to about 30 carbon atoms,  $R^6$  is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and  $x$  is an average number from 1 to about 60;

150

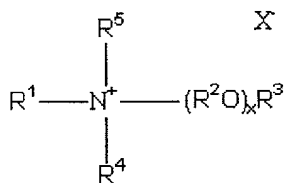
(n) dialkoxylated quaternary ammonium salts having the formula:



(29)

wherein R<sup>1</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> in each of the x (R<sup>2</sup>O) and y (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R<sup>4</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X<sup>-</sup> is an agriculturally acceptable anion, provided, however, that either R<sup>1</sup> or R<sup>4</sup> is other than alkyl;

(o) monoalkoxylated quaternary ammonium salts having the formula:



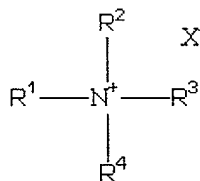
(30)

wherein R<sup>1</sup> and R<sup>5</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>4</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> in each of the x (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X<sup>-</sup> is an agriculturally acceptable anion;

(p) quaternary ammonium salts having the formula:

165

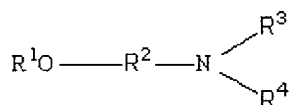




(31)

wherein  $\text{R}^1$ ,  $\text{R}^3$  and  $\text{R}^4$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $\text{R}^2$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and  $\text{X}^-$  is an agriculturally acceptable anion, provided, however that  $\text{R}^1$  is not alkyl when  $\text{R}^2$ ,  $\text{R}^3$  and  $\text{R}^4$  are lower alkyl;

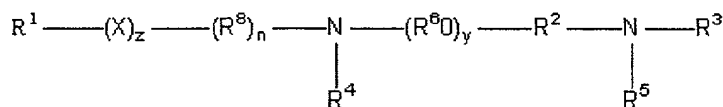
(q) etheramines having the formula:



(32)

wherein  $\text{R}^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $\text{R}^2$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms;  $\text{R}^3$  and  $\text{R}^4$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^5\text{O})_x\text{R}^6$ ,  $\text{R}^5$  in each of the  $x(\text{R}^5\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^6$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 50;

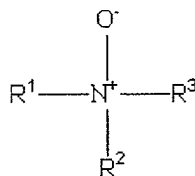
(r) diamines having the formula:



(33)

185 wherein  $R^1$ ,  $R^3$ ,  $R^4$  and  $R^5$  are independently hydrogen, hydrocarbyl or substituted  
hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^6O)_xR^7$ ;  $R^2$  and  $R^8$  are  
independently hydrocarbylene or substituted hydrocarbylene having from 2 to about  
30 carbon atoms,  $R^6$  in each of the  $x$  ( $R^6O$ ) and  $y$  ( $R^6O$ ) groups is independently  
190  $C_2-C_4$  alkylene,  $R^7$  is hydrogen, or a linear or branched alkyl group having from 1 to  
about 30 carbon atoms,  $x$  is an average number from 1 to about 30,  $X$  is  $-O-$ ,  $-$   
 $N(R^6)-$ ,  $-C(O)-$ ,  $-C(O)O-$ ,  $-OC(O)-$ ,  $-N(R^9)C(O)-$ ,  $-C(O)N(R^9)-$ ,  $-S-$ ,  $-SO-$ , or  $-SO_2-$ ,  $y$  is  
0 or an average number from 1 to about 30,  $n$  and  $z$  are independently 0 or 1, and  
 $R^9$  is hydrogen or hydrocarbyl or substituted hydrocarbyl;

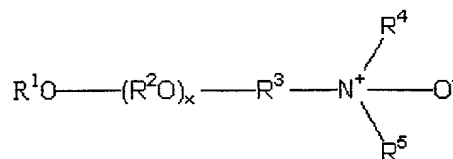
(s) amine oxides having the formula:



(34)

195 wherein  $R^1$ ,  $R^2$  and  $R^3$  are independently hydrogen, hydrocarbyl or substituted  
hydrocarbyl having from 1 to about 30 carbon atoms,  $-(R^4O)_xR^5$ , or  $-R^6(OR^4)_xOR^5$ ;  
 $R^4$  in each of the  $x$  ( $R^4O$ ) groups is independently  $C_2-C_4$  alkylene,  $R^5$  is hydrogen, or  
a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  
200  $R^6$  is a hydrocarbylene or substituted hydrocarbylene having from 1 to about 6  
carbon atoms,  $x$  is an average number from 1 to about 50, and the total number of  
carbon atoms in  $R^1$ ,  $R^2$  and  $R^3$  is at least 8;

(t) alkoxyated amine oxides having the formula:

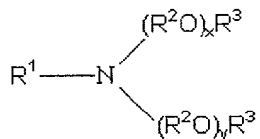


(35)

205 wherein  $R^1$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to  
about 30 carbon atoms;  $R^2$  in each of the  $x$  ( $R^2O$ ) and  $y$  ( $R^2O$ ) groups is  
independently  $C_2$ - $C_4$  alkylene;  $R^3$  is a hydrocarbylene or substituted hydrocarbylene  
having from 2 to about 6 carbon atoms;  $R^4$  and  $R^5$  are each independently  
210 hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon  
atoms,  $-(R^6)_n-(R^2O)_yR^7$ ;  $R^6$  is hydrocarbylene or substituted hydrocarbylene  
containing from 1 to about 6 carbon atoms,  $R^7$  is hydrogen or a linear or branched  
alkyl group having 1 to about 4 carbon atoms,  $n$  is 0 or 1, and  $x$  and  $y$  are  
independently an average number from 1 to about 60;

(u) dialkoxylated amines having the formula:

215

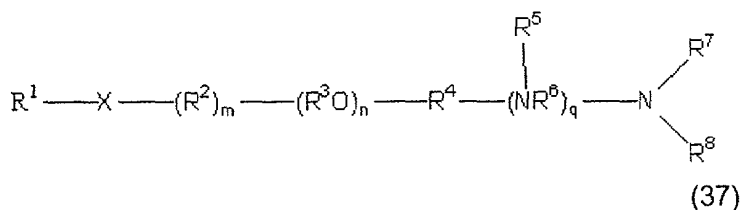


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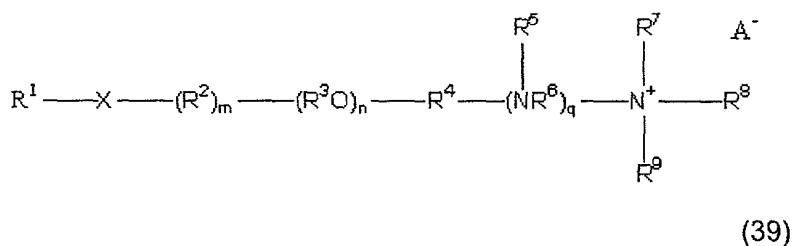
wherein  $R^1$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to  
about 30 carbon atoms,  $-R^4SR^5$ , or  $-(R^2O)_zR^3$ ,  $R^2$  in each of the  $x$  ( $R^2O$ ),  $y$  ( $R^2O$ ) and  
220  $z$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrogen, or a linear or  
branched alkyl group having from 1 to about 22 carbon atoms,  $R^4$  is a linear or  
branched alkyl group having from about 6 to about 30 carbon atoms,  $R^5$  is a linear  
or branched alkyl group having from about 4 to about 15 carbon atoms, and  $x$ ,  $y$   
and  $z$  are independently an average number from 1 to about 40, provided, however,  
225 that when  $R^1$  is alkyl, either the sum of  $x$  and  $y$  is greater than 20 or  $R^3$  is other than  
hydrogen;

(v) aminated alkoxylated alcohols having the following chemical structure:

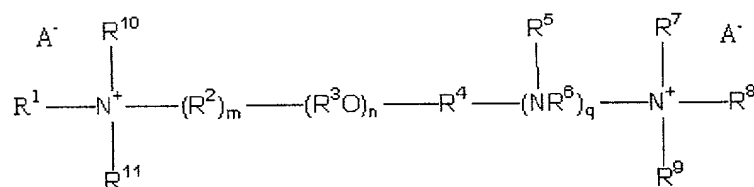


wherein  $R^1$ ,  $R^7$ ,  $R^8$ , and  $R^9$  are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^{11})_s(R^3O)_vR^{10}$ ;  $X$  is  $-O-$ ,  $-OC(O)-$ ,  $-C(O)O-$ ,  $-N(R^{12})C(O)-$ ,  $-C(O)N(R^{12})-$ ,  $-S-$ ,  $-SO-$ ,  $-SO_2-$  or  $-N(R^9)-$ ;  $R^3$  in each of the  $n$   $(R^3O)$  groups and the  $v$   $(R^3O)$  groups is independently  $C_2-C_4$  alkylene;  $R^{10}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $R^2$  and  $R^{11}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms;  $R^{12}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-C(=NR^{12})-$ ,  $-C(S)-$ , or  $-C(O)-$ ;  $q$  is an integer from 0 to 5; and  $R^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

(w) a quaternary ammonium, sulfonium or sulfoxonium salt having the following chemical structure:

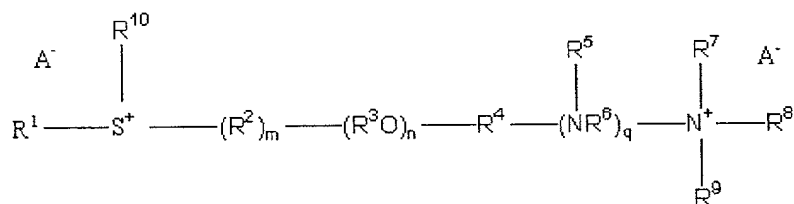


or



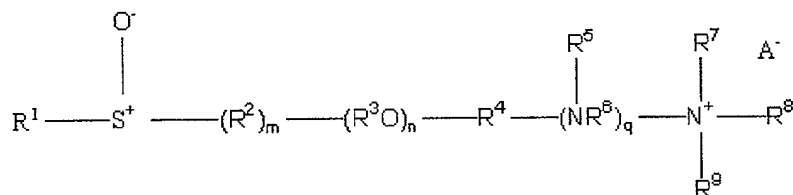
(40)

or



(41)

or

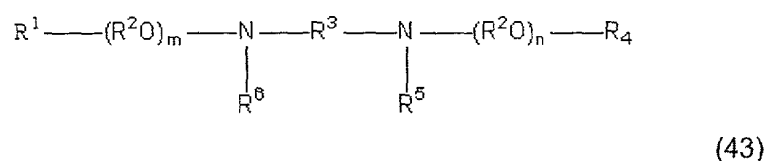


(42)

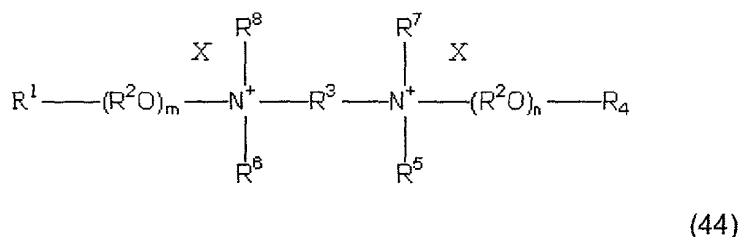
wherein  $\text{R}^1$ ,  $\text{R}^7$ ,  $\text{R}^8$ ,  $\text{R}^9$ ,  $\text{R}^{10}$  and  $\text{R}^{11}$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^{13})_s(\text{R}^3\text{O})_v\text{R}^{12}$ ;  $\text{X}$  is  $-\text{O}-$ ,  $-\text{OC}(\text{O})-$ ,  $-\text{N}(\text{R}^{14})\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})\text{N}(\text{R}^{14})-$ ,  $-\text{C}(\text{O})\text{O}-$ , or  $-\text{S}-$ ;  $\text{R}^3$  in each of the  $n$   $(\text{R}^3\text{O})$  groups and  $v$   $(\text{R}^3\text{O})$  groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene;  $\text{R}^{12}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $\text{R}^2$  and  $\text{R}^{13}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $\text{R}^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon

atoms;  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-C(=NR^{12})-$ ,  $-C(S)-$ , or  $-C(O)-$ ;  $R^{14}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $q$  is an integer from 0 to 5;  $R^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each  $A^-$  is an agriculturally acceptable anion;

(x) a diamine or diammonium salt having the formula:

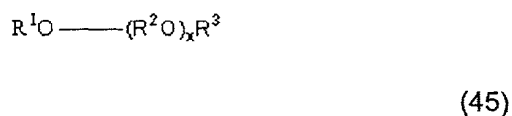


or



wherein  $R^1$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$  and  $R^8$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $m$   $(R^2O)$  and  $n$   $(R^2O)$  groups and  $R^9$  are independently  $C_2-C_4$  alkylene,  $R^3$  is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or  $-(R^2O)_pR^9-$ ,  $m$  and  $n$  are individually an average number from 0 to about 50, and  $p$  is an average number from 0 to about 60;

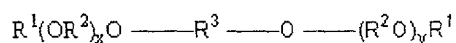
(y) an alkoxyated alcohol having the formula:



wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x$   $(R^2O)$  groups is independently  $C_2-C_4$  alkylene,  $R^3$

285 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60, provided, however, that when R<sup>1</sup> is alkyl, either R<sup>3</sup> is other than hydrogen or x is at least 10;

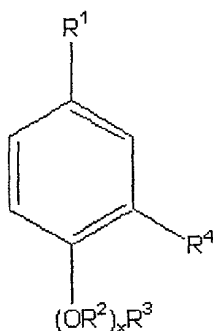
(z) dialkoxylated alcohols having the formula:



(46)

290 wherein R<sup>1</sup> is independently hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R<sup>2</sup> in each of the x (R<sup>2</sup>O) and the y (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, and x and y are independently an average number from 1 to about 60;

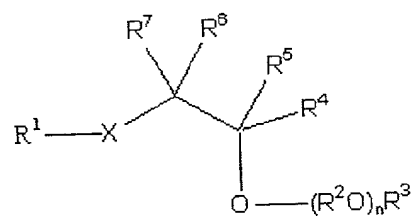
295 (aa) alkoxyated dialkylphenols having the formula:



(47)

300 wherein R<sup>1</sup> and R<sup>4</sup> are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of R<sup>1</sup> and R<sup>4</sup> is an alkyl group, R<sup>2</sup> in each of the x (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60;

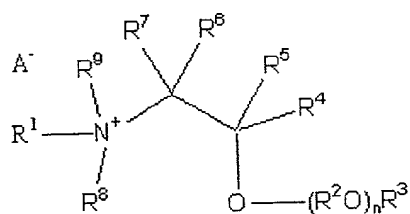
(bb) a compound of the formula:



(48)

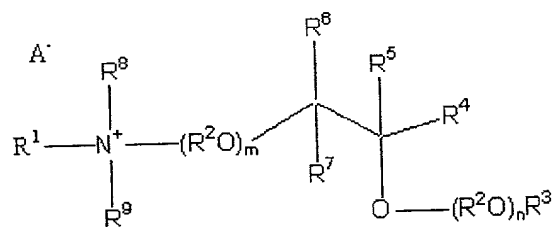
305

or



(49)

or

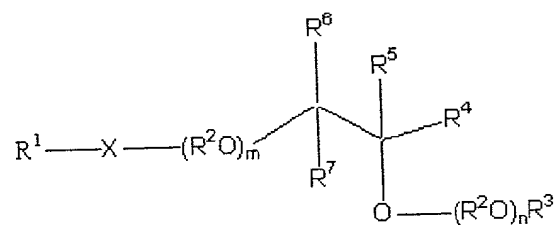


(50)

310

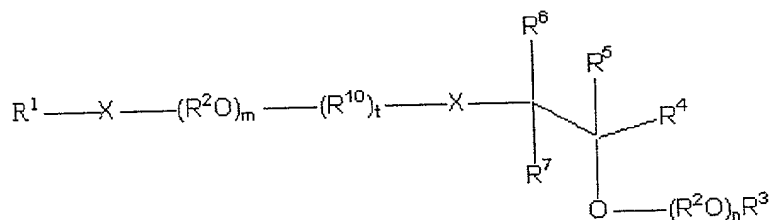
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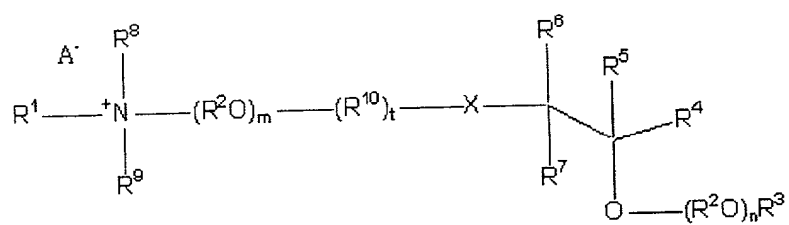
(51)

or



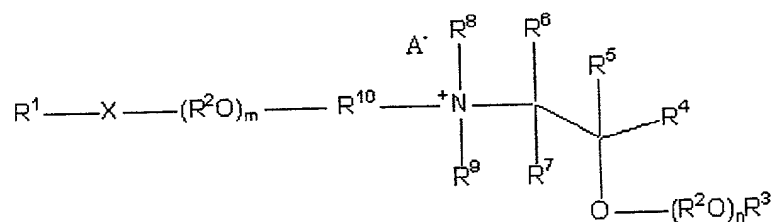
(52)

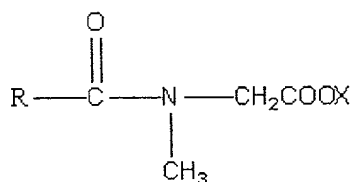
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(53)

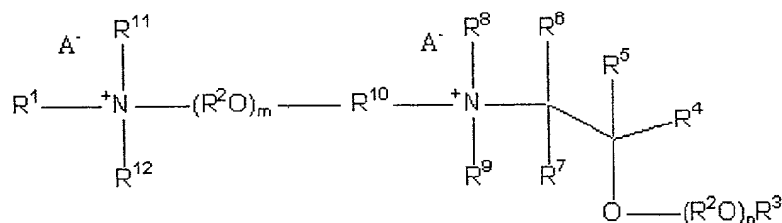
or





(54)

or

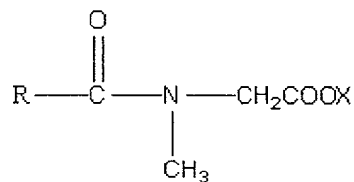


(55)

wherein  $\text{R}^1$ ,  $\text{R}^9$ , and  $\text{R}^{12}$  are independently hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^2\text{O})_p\text{R}^{13}$ ;  $\text{R}^2$  in each of the  $m$   $(\text{R}^2\text{O})$ ,  $n$   $(\text{R}^2\text{O})$ ,  $p$   $(\text{R}^2\text{O})$  and  $q$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene;  $\text{R}^3$ ,  $\text{R}^8$ ,  $\text{R}^{11}$ ,  $\text{R}^{13}$  and  $\text{R}^{15}$  are independently hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $\text{R}^4$  is  $-(\text{CH}_2)_y\text{OR}^{13}$  or  $-(\text{CH}_2)_y\text{O}(\text{R}^2\text{O})_q\text{R}^3$ ;  $\text{R}^5$ ,  $\text{R}^6$  and  $\text{R}^7$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $\text{R}^4$ ;  $\text{R}^{10}$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms;  $\text{R}^{14}$  is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{CH}_2)_z\text{O}(\text{R}^2\text{O})_p\text{R}^3$ ;  $m$ ,  $n$ ,  $p$  and  $q$  are independently an average number from 1 to about 50;  $\text{X}$  is independently  $-\text{O}-$ ,  $-\text{N}(\text{R}^{14})-$ ,  $-\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})\text{O}-$ ,  $-\text{OC}(\text{O})-$ ,  $-\text{N}(\text{R}^{15})\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})\text{N}(\text{R}^{15})-$ ,  $-\text{S}-$ ,  $-\text{SO}-$ , or  $-\text{SO}_2-$ ;  $t$  is 0 or 1;  $\text{A}^-$  is an agriculturally acceptable anion; and  $y$  and  $z$  are independently an integer from 0 to about 30;

(cc) an N-acyl sarcosinate having the formula:

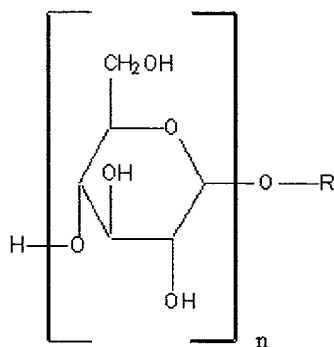
345



(61)

wherein R is C<sub>8</sub> to C<sub>22</sub> N-acyl, preferably a fatty acid of chain length C<sub>10</sub> to C<sub>18</sub>, and X is an agriculturally acceptable anion;

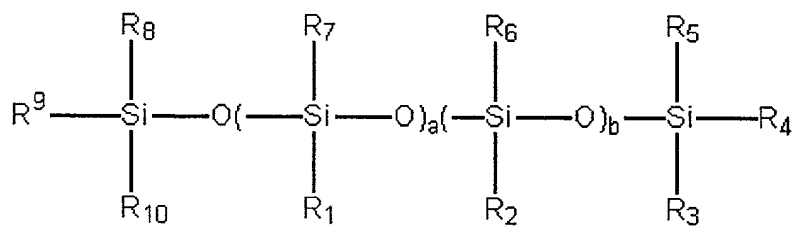
(dd) a glycoside having the formula:



(62)

wherein n is the degree of polymerization, or number of glucose groups, and R is a branched or straight chain alkyl group preferably having from 4 to 18 carbon atoms, or a mixture of alkyl groups having an average value within the given range; or

(ee) a polysiloxane having the formula:



(63)

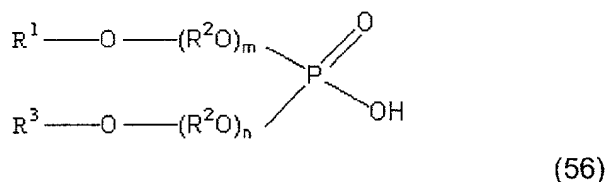
wherein  $R^1$  is  $-C_nH_{2n}O(CH_2CH_2O)_m(CH_2CH(CH_3)O)_qX$ ,  $n$  is 0 to 6,  $a$  is 0 to about 100,  $b$  is 0 to about 10,  $m$  is 0 to about 30,  $q$  is 0 to about 30,  $X$  is hydrogen or a  $C_{1-20}$  hydrocarbyl or  $C_{2-6}$  acyl group, and  $R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}$  groups are independently substituted or unsubstituted  $C_{1-20}$  hydrocarbyl or nitrogen containing groups;

(ff) a compound having the formula:



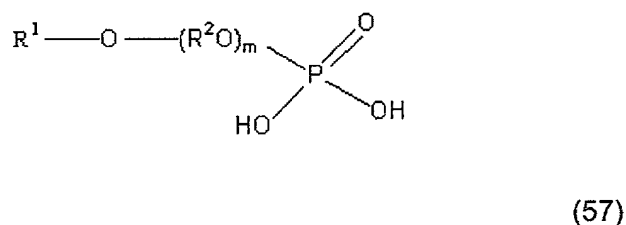
wherein  $R_1$  is a hydrocarbyl group having from about 8 to about 22 carbon atoms, each of the  $n$   $(R_2O)$  groups is independently  $C_2-C_4$  alkylene,  $n$  is a number from 0 to about 60, and  $X_1$  is a carboxylate, sulfate or phosphate;

(gg) a phosphate diester having the formula:



wherein  $R^1$  and  $R^3$  are independently a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms;  $R^2$  in each of the  $m$   $(R^2O)$  and the  $n$   $(R^2O)$  groups is independently  $C_2-C_4$  alkylene; and  $m$  and  $n$  are independently from 1 to about 30; and

(hh) a phosphate ester having the formula:



wherein R<sup>1</sup> is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms; R<sup>2</sup> in each of the m (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene; and m is from 1 to about 30; and

(ii) an anionic surfactant selected from the group consisting of fatty soaps, alkyl sulfates, sulfated oils, ether sulfates, sulfonates, sulfosuccinates, sulfonated amides and isethionates.

124. A composition of claim 123 wherein said oxalic acid comprises an alkali metal salt, alkanolamine salt, alkylamine salt, tetraalkylammonium salt, or aryltrialkylammonium salt of oxalic acid.

125. A solid pesticidal concentrate composition comprising:

a water-soluble pesticide present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

a compound which increases cell membrane permeability within the plant to increase cellular uptake of the pesticide in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture,

wherein the weight ratio of said pesticide to said compound is at least 2.5:1.

126. A composition of claim 125 further including a surfactant component comprising one or more surfactants.

127. A composition of claim 125 wherein said compound comprises oxalic acid or a salt thereof.

128. A solid herbicidal concentrate composition comprising:

a glyphosate salt or ester present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

a compound which increases cell membrane permeability within the plant to increase cellular uptake of the pesticide in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

129. A composition of claim 128 further including a surfactant component comprising one or more surfactants.

130. A composition of claim 128 wherein said compound comprises oxalic acid or a salt thereof.

131. A solid pesticidal concentrate composition comprising:

a water-soluble pesticide present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

a compound which suppresses oxidative burst in cells of the plant to interfere with plant defense response in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture,

wherein the weight ratio of said pesticide to said compound is at least 2.5:1.

132. A composition of claim 131 further including a surfactant component comprising one or more surfactants.

133. A composition of claim 131 wherein said compound comprises oxalic acid or a salt thereof.

134. A solid herbicidal concentrate composition comprising:

a glyphosate salt or ester present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

5 a compound which suppresses oxidative burst in cells of the plant to interfere with plant defense response in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

135. A composition of claim 134 further including a surfactant component comprising one or more surfactants.

136. A composition of claim 134 wherein said compound comprises oxalic acid or a salt thereof.

137. A solid pesticidal concentrate composition comprising:

a water-soluble pesticide present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

5 a compound which increases expression of hydroxyproline-rich glycoproteins which increases movement of said pesticide to the phloem in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture,

10 wherein the weight ratio of said pesticide to said compound is at least 2.5:1.

138. A composition of claim 137 further including a surfactant component comprising one or more surfactants.

139. A composition of claim 137 wherein said compound comprises oxalic acid or a salt thereof.

140. A solid herbicidal concentrate composition comprising:

a glyphosate salt or ester present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to the foliage of a susceptible plant; and

5 a compound which increases expression of hydroxyproline-rich glycoproteins which increases movement of said pesticide to the phloem in the plant treated with said enhanced application mixture as compared to a plant treated with a reference application mixture devoid of said compound but otherwise having the same composition as said enhanced application mixture.

141. A composition of claim 140 further including a surfactant component comprising one or more surfactants.

142. A composition of claim 140 wherein said compound comprises oxalic acid or a salt thereof.

143. A solid pesticidal concentrate composition comprising:

a water-soluble pesticide present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant; and

5 oxalic acid or a salt thereof;

wherein said glyphosate and said oxalic acid are present in a weight ratio of at least 2.5:1.

144. A composition of claim 143 further including a surfactant component comprising one or more surfactants.

145. A composition of claim 144 wherein said pesticide and said surfactant are present in a weight ratio of between about 2:1 and 30:1.



146. A solid pesticidal concentrate composition comprising:

a glyphosate salt or ester present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant; and

5           oxalic acid or a salt thereof.

147. A composition of claim 146 further including a surfactant component comprising one or more surfactants.

148. A solid pesticidal concentrate composition comprising:

a water-soluble pesticide present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

5           oxalic acid or a salt thereof; and

a surfactant component comprising one or more cationic or nonionic surfactants.